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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/837,397

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Shuichi Kikuchi

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7590

03/20/2003

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EXAMINER

LEWIS, MONICA

ART UNIT

PAPER NUMBER

2822

DATE MAILED: 03/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/837,397

Applicant(s)

KIKUCHI ET AL.

Examiner

Monica Lewis

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 January 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) 7-12 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 April 2001 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 14 January 2003 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. This office action is in response to the amendment filed January 14, 2003.

Response to Arguments

2. Applicant's arguments with respect to claims 1-6 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claim 4 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The "low concentration source region" is not disclosed.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 4 recites the limitation "said low concentration source region" and Claim 6 recites the limitation "said high concentration source drain region." There is insufficient antecedent basis for this limitation in the claim.

Drawings

7. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the “high concentration source region is formed in said low concentration source region” must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 1-6 are rejected under 35 U.S.C. 103(a) as obvious over Hsing et al. (U.S. Patent No. 5,517,046) in view of Kuroi et al. (Japanese Patent No. 402280342).

In regards to claim 1, Hsing et al. (“Hsing”) discloses the following:

- a) a semiconductor substrate (20) of a first conductive type (See Figure 3);
- b) a gate insulation film (24) disposed over the semiconductor substrate (See Figure 3);
- c) a gate electrode (26) provided on the gate insulation film (See Figure 3);
- d) a high concentration source region (32) of a second conductive type at one end of said gate electrode (See Figure 3);

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e) a low concentration drain region (31) of the second conductive type provided to face said source region through a channel region (See Figure 3);

f) a high concentration drain region (34) of the second conductive type spaced away from another end of said gate electrode and disposed in said low concentration drain region (See Figure 3); and

g) a middle concentration layer (22) of the second conductive type disposed in said low concentration drain region and disposed at least from a predetermined position spaced away from said gate electrode to said high concentration drain region (See Figure 3).

In regards to claim 1, Hsing fails to disclose the following:

a) source region disposed in the substrate.

However, Kuroi et al. ("Kuroi") discloses a source region disposed in the substrate (See Figure 1). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Hsing to include a source region disposed in the substrate as disclosed in Kuroi because it aids in increasing in increasing the lifetime of the element (See Abstract).

Additionally, since Hsing and Kuroi are both from the same field of endeavor, the purpose disclosed by Kuroi would have been recognized in the pertinent art of Hsing.

b) an impurity concentration of said middle concentration layer increases from said gate electrode to near said high concentration drain region.

However, Kuroi discloses an impurity concentration of said middle concentration layer increases from said gate electrode to near said high concentration drain region (See Figure 1). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Hsing to include an impurity concentration of a middle concentration layer that increases from said gate electrode to near said

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high concentration drain region as disclosed in Kuroi because it aids in increasing in increasing the lifetime of the element (See Abstract).

Additionally, since Hsing and Kuroi are both from the same field of endeavor, the purpose disclosed by Kuroi would have been recognized in the pertinent art of Hsing.

In regards to claim 2, Hsing fails to disclose the following:

a) middle concentration layer is concentration layer is formed so that the impurity concentration gradually increases from said gate electrode to said high concentration drain region.

However, Kuroi discloses a middle concentration layer is concentration layer is formed so that the impurity concentration gradually increases from said gate electrode to said high concentration drain region (See Figure 1). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Hsing to include middle concentration layer is concentration layer is formed so that the impurity concentration gradually increases from said gate electrode to said high concentration drain region as disclosed in Kuroi because it aids in increasing in increasing the lifetime of the element (See Abstract).

Additionally, since Hsing and Kuroi are both from the same field of endeavor, the purpose disclosed by Kuroi would have been recognized in the pertinent art of Hsing.

In regards to claim 3, Hsing fails to disclose the following:

a) middle concentration layer is formed so that the impurity concentration increases step by step from said gate electrode to said high concentration drain region.

However, Kuroi discloses a middle concentration layer is formed so that the impurity concentration increases step by step from said gate electrode to said high concentration drain region (See Figure 1). It would have been obvious to one having ordinary skill in the art at the

time the invention was made to modify the semiconductor device of Hsing to include a middle concentration layer is formed so that the impurity concentration increases step by step from said gate electrode to said high concentration drain region as disclosed in Kuroi because it aids in increasing in increasing the lifetime of the element (See Abstract).

Additionally, since Hsing and Kuroi are both from the same field of endeavor, the purpose disclosed by Kuroi would have been recognized in the pertinent art of Hsing.

In regards to claims 5 and 6, Hsing discloses the following:

a) middle concentration layer is formed at an entire region spanning from said gate electrode to said high concentration source drain region (See Figure 3).

Conclusion

10. The following prior art made of record and not relied upon is considered pertinent to applicant's disclosure: a) Nishinohara (U.S. Publication No. 2003/0006457) discloses a MIS semiconductor device.

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monica Lewis whose telephone number is 703-305-3743.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 703-308-4905. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7722 for regular and after final communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

ML

March 12, 2003


AMIR ZARABIAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800